Cluster Statement		Standard	Keep or Propose Change	Change: Removed, Re-written, Broken Up	Quality Standard Rule #	Reason for Proposed Change
Perform arithmetic operations with	N.CN.3	N.CN.3 (+) Find the conjugate of a complex number; use conjugates to find moduli and quotients of complex numbers.	Keep			
(+) Represent complex numbers and their operations	N.CN.4	N.CN.4 (+) Represent complex numbers on the complex plane in rectangular and polar form (including real and imaginary numbers), and explain why the rectangular and polar forms of a given complex number represent the same number.	Keep			
(+) Represent complex numbers and their	N.CN.5	N.CN.5 (+) Represent addition, subtraction, multiplication, and conjugation of complex numbers geometrically on the complex plane; use properties of this representation for computation.	Keep			
(+) Represent complex numbers and their	N.CN.6	N.CN.6 (+) Calculate the distance between numbers in the complex plane as the modulus of the difference, and the midpoint of a segment as the average of the numbers at its endpoints.	Keep			
(+) Represent complex numbers and their	N.CN.8	N.CN.8 (+) Extend polynomial identities to the complex numbers. For example, rewrite $x^2 + 4$ as $(x + 2i)(x - 2i)$.	Keep	Moved from Algebra to Year4	1,2	
(+) Represent complex numbers and their	N.CN.9	N.CN.9 (+) Know the Fundamental Theorem of Algebra; show that it is true for quadratic polynomials.	Keep	Moved from Algebra to Year4	1,2	
(+) Represent and model with vector quantities.	N.VM.1	N.VM.1 (+) Recognize vector quantities as having both magnitude and direction. Represent vector quantities by directed line segments, and use appropriate symbols for vectors and their magnitudes (e.g., v, |v|, ||v||, v).	Change	Get rid of example	3	

(+) Represent and model with vector	N.VM.2	N.VM.2 (+) ~~Find the components of a vector by subtracting the coordinates of an initial point from the coordinates of a terminal point.~~**Write a vector in component form**.	Change	Clarify	3	
(+) Represent and model with vector	N.VM.3	N.VM.3 (+) Solve problems involving velocity and other quantities that can be represented by vectors.	Keep			
(+) Perform operations on vectors.	N.VM.4	N.VM.4 (+) Add and subtract vectors. 4a. (+) Add vectors end-to-end, component-wise, and by the parallelogram rule. Understand that the magnitude of a sum of two vectors is typically not the sum of the magnitudes. 4b. (+) Given two vectors in magnitude and direction form, determine the magnitude and direction of their sum. 4c. (+) Understand vector subtraction v – w as v + (–w), where –w is the additive inverse of w, with the same magnitude as w and pointing in the opposite direction. Represent vector subtraction graphically by connecting the tips in the appropriate order, and perform vector subtraction component-wise.	Keep			
(+) Perform operations on vectors.	N.VM.5	N.VM.5 (+) Multiply a vector by a scalar. 5a. (+) Represent scalar multiplication graphically by scaling vectors and**/or** ~~possibly~~ reversing their direction; perform scalar multiplication component-wise, ~~e.g., as c(vx, vy) = (cvx, cvy)~~. 5b. (+) Compute the magnitude of a scalar multiple cv ~~using ‖cv‖ = |c|v~~. Compute the direction of cv knowing that when |c|v ≠ 0, the direction of cv is either along v (for c > 0) or against v (for c < 0).	Change	Example not helpful	3	
(+) Perform operations on matrices	N.VM.6	N.VM.6 (+) Use matrices to represent and manipulate data, ~~e.g., to represent payoffs or incidence relationships in a network~~.	Change	Example not helpful	3	

			Change		
(+) Perform operations on matrices	N.VM.7	N.VM.7 (+) Multiply matrices by scalars to produce new matrices, ~~e.g., as when all of the payoffs in a game are doubled.~~	Change	Example not helpful	3
(+) Perform operations on matrices	N.VM.8	N.VM.8 (+) Add, subtract, and multiply matrices of appropriate dimensions.	Keep		
(+) Perform operations on matrices and use	N.VM.9	N.VM.9 (+) Understand that~~, unlike multiplication of numbers~~, matrix multiplication for square matrices is not a commutative operation, but still satisfies the associative and distributive properties.	Change	Clarify	3
(+) Perform operations on matrices and use matrices in	N.VM.10	N.VM.10 (+) Understand that the zero and identity matrices play a role in matrix addition and multiplication similar to the role of 0 and 1 in the real numbers. **Discover that t**he determinant of a square matrix is nonzero if and only if the matrix has a multiplicative inverse.	Change	Clarify the intent of the standard	3
(+) Perform operations on matrices and use	N.VM.11	N.VM.11 (+) Multiply a vector (regarded as a matrix with one column) by a matrix of suitable dimensions to produce another vector. Work with matrices as transformations of vectors.	Keep		
(+) Perform operations on matrices	N.VM.12	N.VM.12 (+) Work with 2 × 2 matrices as transformations of the plane, and interpret the absolute value of the determinant in terms of area.	Keep		
Use polynomial identities to solve	A.APR.5*	A.APR.5 (+) Know and apply the Binomial Theorem for the expansion of $(x + y)^n$ in powers of x and y for a positive integer n, where x and y are any numbers, with coefficients determined for example by Pascal's	Change	Moved from Algebra to Year4 and removed	1,2
Rewrite rational expressions.	A.APR.7*	A.APR.7 (+) ~~Understand~~ **Discover** that rational expressions form a system analogous to the rational numbers, closed under addition, subtraction, multiplication, and division by a nonzero rational	Change	Moved from Algebra to Year4	1,2

Solve systems of equations.	A.REI.8	A.REI.8 (+) Represent a system of linear equations as a single matrix equation in a vector variable.	Keep			
Solve systems of equations.	A.REI.9	A.REI.9 (+) ~~Find the inverse of a matrix (if it exists) and use it to solve systems of linear equations~~ **Use matrices to solve systems of linear equations** (using technology for matrices of dimension 3 × 3 or	Change	Clarify	3	
Write expressions in equivalent forms to solve problems.	A.SSE.4	A.SSE.4 (+) Derive the formula for the sum of a finite geometric series (when the common ratio is not 1), and use the formula to solve problems. (Uses Modeling)	Change	Moved from Algebra to Year4		
Write expressions in equivalent forms to solve problems.	A.SSE.5	**A.SSE.5 (+) Use summation notation to describe the sums in a series.**	ADD	Added for Pre-Calc course material	1	
Build a function that models a relationship between two quantities.	F.BF.1	F.BF.1 (+) Write a function that describes a relationship between two quantities. (Uses Modeling) 1c. (+) Compose functions **in context**. ~~For example, if T(y) is the temperature in the atmosphere as a function of height, and h(t) is the height of a weather balloon as a function of time, then T(h(t)) is the temperature~~	Change	Clarify	3	

Build new functions from existing functions.	F.BF.4	F.BF.4 **(+)** Find inverse functions. 4b. (+) Verify by composition that one function is the inverse of another. 4c. (+) Read values of an inverse function from a graph or a table, given that the function has an inverse. 4d. (+) Produce an invertible function from a non-invertible function by restricting the domain.	Keep			
Build new functions from existing	F.BF.5	F.BF.5 (+) Understand the inverse relationship between exponents and logarithms and use this relationship to solve problems involving logarithms and exponents.	Keep			
Build new functions from existing functions.	F.BF.6	**F.BF.6 (+) Use reciprocal properties to develop definitions for cotangent, cosecant, and secant.**	ADD	Added for Pre-Calc course material	1	
Extend the domain of trigonometric functions using the unit circle.	F.TF.3	F.TF.3 (+) Use special triangles to determine geometrically the values of sine, cosine, tangent for pi/3, pi/4 and pi/6, and use the unit circle to express the values of sine, cosine, and tangent for pi-x, pi+x, and 2pi–x in terms of their values for x, where x is any real number.	Keep	Be sure to use the symbol for pi in the standard		
Extend the domain of trigonometric functions	F.TF.4	F.TF.4 (+) Use the unit circle to explain symmetry (odd and even) and periodicity of trigonometric functions.	Keep			
Model periodic phenomena with	F.TF.6	F.TF.6 (+) Understand that restricting a trigonometric function to a domain on which it is always increasing or always decreasing allows its inverse to be constructed.	Keep			

Model periodic phenomen a with trigonometr	F.TF.7	F.TF.7 (+) Use inverse functions to solve trigonometric equations that arise in modeling contexts; evaluate the solutions using technology, and interpret them in terms of the context. (Uses Modeling)	Keep			
Prove and apply trigonometr ic	F.TF.9	F.TF.9 (+) Prove the addition and subtraction, **half-angle, and double-angle** formulas for sine, cosine, and tangent and use them to solve problems.	Change	Added for Pre-Calc course material	1	
Prove and apply trigonometr ic	F.TF.11	**F.TF.11 (+) Use fundamental trigonometric identities. 11a. (+) Verify trigonometric identities 11b. (+) Evaluate trigonometric functions 11c. (+) Write equivalent trigonometric expressions and**	ADD	Added for Pre-Calc course material	1	
(+) Apply trigonometr y to general triangles.	G.SRT.9	G.SRT.9 (+) Derive the formula A = 1/2 ab sin(C) for the area of a triangle by drawing an auxiliary line from a vertex perpendicular to the opposite side **and use the formula to solve problems**.	Change	Add applcation	1	
(+) Apply trigonometr y to general triangles.	G.SRT.10	G.SRT.10 (+) Prove the Laws of Sines and Cosines and use them to solve problems **involving right and non-right triangles.**	Change	Remove redundancy by combining G.SRT.10	3	
~~(+) Apply trigonometr y to general triangles.~~	~~G.SRT.11~~	~~G.SRT.11 (+) Understand and apply the Law of Sines and the Law of Cosines to find unknown measurements in right and non-right triangles (e.g., surveying problems, resultant forces).~~	~~Keep~~			
Analyze functions using different	**F.IF.7**	**F.IF.7 (+) Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. (Uses Modeling)**	Change	Add, based on conversation with Algebra I	1,2,3	
Translate between the geometric	G.GPE.2	G.GPE.2 ~~Derive the equation of a parabola given a focus and directrix.~~	Moved from Geometry to 4th	Replaced by the G.GPE.3 rewrite below	1	
Translate between the geometric	G.GPE.3	~~G.GPE.3 (+) Derive the equations of ellipses and hyperbolas given the foci, using the fact that the sum or difference of distances from the foci is constant.~~ **G.GPE.3 (+) Analyze conic sections using**	Change (from California standards	Completely rewritten to better reflect the	1	

Explain volume formulas and use	G.GMD.2	~~G.GMD.2 (+) Give an informal argument using Cavalieri's principle for the formulas for the volume of a sphere and other solid figures.~~	Move to Geometry and combine	Moved to Geometry, but they should add	2	
(+) Calculate expected values and use them to solve	S.MD.1	S.MD.1 (+) ~~Define a random variable for a quantity of interest by a~~**A**ssigning a numerical value to each event in a sample space; graph the corresponding probability distribution using the same graphical displays as for data distributions.	Change	Clarified	3	
(+) Calculate expected values and	S.MD.2	S.MD.2 (+) Calculate the expected value of a random variable; ~~interpret~~ **understand that** it **is** ~~as~~ the mean of the probability distribution.	Change	Re-written	3	
(+) Calculate expected values and	S.MD.3	S.MD.3 (+) Develop a probability distribution for a random variable defined for a sample space in which theoretical probabilities can be calculated; ~~find~~ **calculate** the expected value. *For example, find the*	Change find to calculate	Re-written	3	
(+) Calculate expected values and	S.MD.4	S.MD.4 (+) Develop a probability distribution for a random variable defined for a sample space in which probabilities are assigned empirically; ~~find~~ **calculate** the expected value. *For example, find a current data*	Change find to calculate	Re-written	3	
(+) Use probability to evaluate outcomes of decisions.	S.MD.5	S.MD.5 (+) Weigh the possible outcomes of a decision by assigning probabilities to payoff values and ~~finding~~ **calculating the** expected values. 5a. (+) ~~Find~~ **Calculate** the expected payoff for a game of chance. *For example, find the expected winnings from a state lottery ticket or a game at a fast-food restaurant.*	Change find to calculate	Re-written	3	
(+) Use probability to evaluate outcomes	S.MD.6	S.MD.6 (+) Use probabilities to make fair decisions (e.g., drawing by lots, using a random number generator).	Change	Moved to Year 4 from Algebra	1	
(+) Use probability to evaluate outcomes	S.MD.7	S.MD.7 (+) Analyze decisions and strategies using probability concepts (e.g., product testing, medical testing, pulling a hockey goalie at the end of a game).	Change	Moved to Year 4 from Algebra	1	

Use the rules of probability to compute	S.CP.9	S.CP.9 (+) Use permutations and combinations to compute probabilities of compound events and solve problems.	Keep	Moved from Geometry	1	
Define polar coordinates and the	PC.PC.1	PC.PC.1 (+) Define polar coordinates and the relatationship between polar coordinates and Cartesian coordinates with and without the use of technology.	ADD	Added for Pre-Calc course material	1	
Define polar coordinates and the	PC.PC.2	PC.PC.2 (+) Use polar equations to model and solve problems using graphs and algebraic properties.	ADD	Added for Pre-Calc course material	1	
Define parametric equations	PC.PE.1	PC.PE.1 (+) GIven equations for a parametric function, plot the graph and make conclusions about the geometric figure that results.	ADD	Added for Pre-Calc course material	1	
Define parametric equations	PC.PE.2	PC.PE.2 (+) Convert between a pair of parametric equations and an equation in x and y. Model and solve problems using parametric equations.	ADD	Added for Pre-Calc course material	1	
Define a continuous function	PC.L.1	PC.L.1 (+) Determine if a function is continuous at a point. Find the types of discontinuities of a function and relate them to finding limits of a function. Use the concept of limits to describe	ADD	Added for Pre-Calc course material	1	
Define limits	PC.L.2	PC.L.2 (+) Demonstrate knowledge of both the definition and graphical interpretation of limits of values of functions and sequences.Verify and estimate limits using graphs, tables, and	ADD	Added for Pre-Calc course material	1	
Define limits	PC.L.3	PC.L.3 (+) Evaluate limits of functions and apply properties of limits, including one-sided limits and limits at infinity using algebra.	ADD	Added for Pre-Calc course material	1	
Define sequences	PC.S	PC.S (+) Define arithmetic and geometric sequences and series. Model and solve word problems involving applications of sequences and series, interpret the solutions and determine	ADD	Added for Pre-Calc course material	1	

Solve inequalities	PC.REI	PC.REI (+) Solve linear, quadratic, polynomial, and rational inequalities in two variables algebraically and graphically.	ADD	Added for Pre-Calc course material	1	